UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**
AUGUST 1950

EROSION CONTROL PRACTICES DIVISION

Tentative Results with Erosion Control Practices for Corn Production - H. L. Borst, Wooster, Ohio.-"Both at Wooster and Columbus the corn on the plots prepared by treatments other than plowing appear to be as vigorous as that on the plowed plots. Measurements of height of plant and size of ear indicate that the 'mulch culture' corn has kept pace with the 'plowed' corn. Nitrates are lower on the mulch culture plots but no symptoms of N deficiency have developed. The most interesting treatment is that where the soil was treated (preemergence) with 2-4-D and topdressed with manure immediately.

"Soil losses from the rootbed treatments under erosion measurement (8% slope) are:

Ordinary plowing	- 2.25 tons/acre
Scotch plowing	2.10 tons/acre
Ordinary - Manure topdressed	.34 tons/acre
Trash mulch	.87 tons/acre

"The erosion control value of the Scotch plow is disappointing. Both soil loss and runoff have been nearly as much as from the plowed plot.

"Erosion has not been heavy so far this season. The continuous corn plot has lost approximately 30 tons of soil per acre."

Stubble Mulch Plowing Demonstration - C. J. Whitfield, Amarillo, Texas.-"Members of the Amarillo Station staff participated in a total of 6 stubble mulch plowing demonstrations during the month, 4 of which were in Texas and 2 in New Mexico. In 3 of the demonstations the stubble mulch plow constructed at the Amarillo Station was the only plow used. The remainder of the demonstrations were thrown open to manufacturers of machinery who wished to demonstrate and describe their equipment. Plowing demonstrations were supplemented by talks and question and answer sessions. The meetings were conducted in cooperation with the Extension Service, and brought to a total of 10 the number of such demonstrations carried out this summer in the Texas Panhandle and New Mexico."

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** All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Sericea Hay Yields in Ground Cover Studies in Relation to Soil Treatments - B. H. Hendrickson, Watkinsville, Ga.-"After 10 years of sericea stand establishment and without subsequent tillage, hay yields reported by Mr. W. E. Adams to date in 1950 continue to show consistent responses to different periodic fertilizer applications:

	Hay tons/acre
1. Check	1.85
2. K_2O alone (60 lbs/acre every 3 years)	1.93
3. Lime alone (1 ton/acre every 5 years)	2.02
4. P_2O_5 alone (90 lbs/acre every 3 years)	2.25
5. P_2O_5 and K_2O (above rates every 3 years)	2.86
6. Lime (1 T/A every 5 years), P_2O_5 and K_2O (above rates every 2 years)	3.26
7. Lime (1 ton/acre every 5 years), P_2O_5 and K_2O (1/2 of above rates every year)	3.21

"Fertilization methods 5, 6 and 7 continue to produce best results from the standpoint of satisfactory ground cover and yields.

"These are good land use methods for Class III Southern Piedmont croplands of the Cecil and related series.

"Old sericea stands tend to become somewhat weedy, especially if under-fertilized, overgrazed or harvested several times a season for hay.

"Trials with spike-harrow tillage in the spring to reduce the stand of principally native grasses, tickle grass and broom sedge, in sericea plots caused a slight reduction in hay yields in 1950. There were less weeds in the sericea hay and it was of better quality."

Kudzu Pasture Management - Several kudzu-based Station pastures, all located on either Class IV or Class VII eroded uplands, all oversown to companion sod crops, all wintergrazed, produced in June and July 1950 pasture cage clipping totals of from 1.50 to 2.15 tons per acre, air-dry weights, equivalent to 1.0 to 1.4 cows per acre carrying capacity during these months. This indicates satisfactory recovery of the kudzu stands in all cases.

"One kudzu pasture was closely grazed in June in order to favor an established undergrowth of the perennial tall fescue grass. Kudzu in a second pasture oversown to fescue and ryegrass was moderately grazed during April and May by the Station herd of beef cattle for the same purpose. Similar trials with perennial rescue grass in kudzu pastures indicate that the fescue or the rescue grasses may be retained in good condition as shade-tolerant companion sod crops with kudzu, provided the kudzu growth is not allowed to become over 2' to 2-1/2' tall, or beyond the growth stage when kudzu begins to shade itself and its lower leaves wither and drop off.

"The purpose of overplanting established kudzu pastures to perennial companion sod crops is three-fold: (1) to economically provide forage for winter grazing that does not require repeated fall disking nor reseeding; (2) to supply grass-kudzu summer grazing instead of kudzu alone on a given pasture, and (3) to extend the grazing season and increase the carrying capacity of kudzu pastures. These trials are attracting a lot of popular interest."

Three Benefits Listed from Soil Conservation in Illinois - "E. L. Sauer, federal soil conservationist with the Illinois College of Agriculture, says you can be sure of larger farm profits, higher soil fertility, and less soil erosion. You can't expect these returns immediately, but you should be able to expect them within about 5 years or so.

"He's been at the job for 14 years now, and has detailed figures on almost 400 farms in 15 Illinois counties. Here are a few of his findings:

"Over the years, net farm incomes have averaged from $3.46 to $7.39 an acre higher on farms following a recommended conservation program than on physicially similar farms not following such a program.

"As for higher fertility, a 5-year study of a group of central Illinois farms showed that those with lots of legume-grass crops had a net loss of only 54 cents an acre in plant food removed by crops. This compares with a loss of $2.67 -- 5 times as much -- for farms having only 7 percent of land in legumes and grasses.

"This same study showed that over eight times as much plant food was lost by erosion on the farms with a low proportion of land in legumes and grasses.

"Corn yields have been from 5 to 16 bushels an acre higher on farms having good rotations than on those following usual systems of farming. An on some grain farms with low soil fertility, corn yields have been doubled by leaving one-fourth to one-third of the cropland in legumes and plowing them down to improve fertility."

Oat Yield as Affected by Topsoil Loss - D. M. Whitt, Columbia, Missouri.-"The effect of surface soil depth on oat yield was studied in South Missouri this summer in cooperation with SCS Operations and Veteran On-the-Job-Trainee instructors. Seven tests in five counties showed an average reduction of 5 bushels per acre for each inch of soil lost. Relatively small reductions in yield occur where an inch of soil is lost from a field with 8 to 10 inches of surface soil. Much greater losses, up to 7 bushels per acre, occur where an inch is lost when only 1 to 4 inches remain.

Average oat yields by erosion classes were as follows:

Class 1 - Slight to moderate	45.1 bu./ac.
Class 2 - Moderately severe	36.5 bu./ac.
Class 3 - Severe	21.5 bu./ac.

"These data illustrate quite vividly the fact that erosion can in effect reduce the size of the farm. Based on these yields, a 100-acre farm with Class I erosion becomes an 80-acre farm when eroded to Class II, and only a 50-acre farm when reduced to Class III by soil loss."

The Influence of Conservation Cropping and of Supplemental Irrigation on Sweet Corn Yields - O. R. Neal, New Brunswick, N. J.-"Soil moisture deficiencies during the growing season are most likely on eroded areas and on soils where physical properties have deteriorated under intensive cultivation. This is indicated by field observations and by soil and water loss data from such areas. A part of the interest in and increased use of supplemental irrigation has come about through efforts to correct such moisture deficiencies by irrigation rather than by sound conservation practices.

"In 1949 we started a plot series to study the effects of good and poor conservation cropping systems, with and without irrigation, on soil and water losses and on soil productivity. Sweet corn is grown continuously on some plots and in a 3-year rotation with clover and timothy sod on the remaining areas. All treatments appear in each of four blocks, two of which are irrigated as required. Water is added when the moisture tension at a 6-inch depth reaches 20 inches of Hg. Four irrigations occurred during the 1950 season. Corn yields are shown in the following table.

Treatment	Yield - No. 1 ears/A.	
	Irrigated	Unirrigated
Continuous cultivation	8750	9150
Corn following sod	15600	13200

"The slightly reduced yield under irrigation on continuously cultivated plots is interesting. When soils are in sufficiently poor physical condition to impede drainage, irrigation - when followed by rain - might be harmful to crop growth. It is too early in the study to reach a conclusion on this point. Large yield increases occurred in the sod rotation even without irrigation. Additions of water as needed brought additional increases in yield on this treatment."

Wheat Yields in Relation to Tillage the Third Year after Sweet Clover Treatments - Hugh C. McKay, St. Anthony, Idaho.-"The grain yields are running quite high in this area this year. The plots on the station run from average to very good depending on the practices used. In the sweet clover treatment trials the yields obtained from stubble mulch tillage were somewhat disappointing as shown in the following table. The data given represents the third wheat crop following the sweet clover treatments. The same tillage implements were used in preparing the plots for the subsequent crops as was used in plowing down the sweet clover.

"As shown in the table the moldboard plow gave consistently higher yields than the subsurface plow. The average yield was 28.5 bushels for the moldboard plow and 33.5 bushels for the moldboard. Part of this difference in yield may be due to the cold, wet and late spring we had this year. At least the subsurface plow has been lower in yield in previous years with similar climatic conditions.

Yields of winter wheat in bushels per acre from sweet clover treatment plots. Third crop of wheat following sweet clover or sweet clover and grass.

	Sweet Clover			
	Subsurface Plow		Moldboard	
Height of Plowing Sweet Clover	Cut for hay	Green Manure	Cut for Hay	Green Manure
12 - 14	27.4	29.6	33.7	35.0
20 - 22	28.9	30.4	32.7	33.7
34 - 36	26.3	29.8	31.6	36.8
Average	27.5	29.9	32.7	35.2
Sweet clover grass				
12 - 14	27.9	29.1	33.1	33.3
20 - 22	27.6	28.3	31.1	32.4
34 - 36	28.3	28.2	32.4	35.4
Average	27.9	28.5	32.2	33.7

Overall Averages

Sweet Clover	31.3	Cut for hay	20.1
Sweet clover&grass	30.8	Green manure	31.8
Subsurface Plow	28.5		
Moldboard Plow	33.5	Height of Plowing	
		12 - 14	31.1
		20 - 22	30.6
		34 - 36	31.1

"There is no significant difference between the yields following sweet clover and sweet clover and grass or between any of the various heights of plowing.

"One interesting difference in yield is between whether the sweet clover was cut for hay or utilized as a green manure. When the sweet clover was utilized as a green manure there was an increase in yield of 1.7 bushels per acre which was quite consistent throughout the experiment."

The Effect of Legumes on Nitrate Nitrogen of the Soil - F. L. Duley, Lincoln, Nebraska.-"The effect of different legumes grown last year on the nitrate content of this year's corn land on June 15 at Lincoln, Nebraska, is shown in the following table.

Nitrate-nitrogen content in pounds per acre of various legume plots after being subtilled or plowed under - Sampled June 15, 1950

Treatment	Depth of sampling in feet			
	0-0.5	0-1	0-3	0-6
		Lbs. NO_3-N per acre		
		Subtilled		
Control	12.5	20.3	41.3	64.9
Partridge pea	22.9	36.4	68.3	93.3
Annual sweet clover	26.6	39.1	68.6	91.7
Biennial sweet clover	38.5	59.9	95.2	115.3
Vetch	33.7	51.4	96.7	125.3
Lespedeza	33.6	47.7	74.6	98.1
Mean	27.97	42.47	74.12	98.10
		Plowed under		
Control	17.7	30.5	53.7	74.5
Partridge pea	20.6	36.2	64.5	90.4
Annual sweet clover	22.9	42.3	66.7	90.1
Biennial sweet clover	53.5	106.5	156.7	204.1
Vetch	33.2	77.0	114.6	158.1
Lespedeza	26.3	51.8	81.4	104.8
Mean	29.03	57.38	89.60	120.33

Nitrate in Tobacco Soil Following Winter Covers of Vetch and Woody Residue and a Vetch-Rye Mixture - R. C. Dawson, College Park, Md.- "Nitrate data taken during the 1950 growing season from soil where tobacco followed winter covers of vetch and woody residue and a vetch-rye mixture are summarized in tables 1 & 2. The woody residue consisting of chipped leafy prunings of trees and shrubs had been spread over vetch at the rate of about 2 tons per acre in the fall after the vetch seedlings were well established. In these plots the vetch growth was very heavy when turned in the spring. The vetch-rye mixture plots were seeded at the time the vetch was planted in the woody residue plots and the spring turning date was the same for all plots. Rye on these plots grew dense and tall and had reached the bloom stage when turned, while the vetch growth was sparse representing only a small percentage of the total cover crop.

Table 1.--Mean nitrate nitrogen content (ppm of N.) of plots with the different treatments

Management	Depth of sampling			Management Means
	1st foot	2nd foot	3rd foot	
Woody residues + vetch	10.19	7.00	3.91	7.04
Rye (+ Vetch)	5.00	4.02	2.66	3.89

	Least significant different		
	5% level	1% level	0.1% level
Management	0.70	0.93	1.20
Management X Depths	1.22	1.61	2.08

Table 2.--Mean nitrate nitrogen content (p.p.m. of N.) of all plots as related to depth and date of sampling

Depth	Date of Sampling					Depth Means
	June 13	June 27	July 14	July 29	August 16	
1st foot	7.07	10.23	9.99	7.14	3.54	7.59
2nd foot	4.10	4.98	7.17	6.64	4.67	5.51
3rd foot	2.14	3.25	3.85	4.07	3.14	3.29
Date Means	4.43	6.15	7.00	5.95	3.78	

	Least significant difference		
	5% level	1% level	0.1% level
Dates	1.11	1.47	1.90
Depths	0.86	1.14	1.47
Dates X Depths	1.93	2.55	3.29

"As the tobacco crop developed through the growing season nitrogen deficiency symptoms were evident in the vetch-rye plots, whereas nitrogen deficiency was not apparent in the vetch-woody residue plots. These results suggest that woody residue of the sort used in this test may be applied over fall seeded vetch without the likelihood of causing a nitrate deficiency in the crop that follows. In our studies last year spring applications of the same type of woody residue caused serious nitrogen deficiency; especially where plowed in with a non-legume ground cover. The present seasons' results also serve to illustrate the danger of nitrate deficiency from late turned winter covers mixtures of rye and vetch containing excessive amounts of rye. In previous studies good results have been obtained with late turned vetch-rye mixtures when vetch represented about 25% of the total top growth of the cover crop."

Physical Chemical Properties of Puerto Rico Soils - R. M. Smith, Rio Piedras, P. R.-"Mr. Abruna reports that his research on the physical chemistry behaviour of Puerto Rico soils has been continued during the last two months. The results obtained so far are included in the tables on the following pages.

Factors that Affect Soil Aggregates - Mr. Cernuda has continued our aggregate stability testing and has supervised the handling and separation of forage harvests from the Orocovis forage plots into species. Some recent conclusions regarding aggregate stability are:

1. Repeated wetting and drying was quite destructive of Catalina clay aggregates.
2. Immersion of Catalina clay aggregates in water and soaking for 30 minutes was as destructive as when soaking was continued as much as 5 days.
3. Reduction of temperature of air dry soil to 0°C had no marked influence on stability of 2 different samples compared to heating to 100°. High temperatures, i.e., 500°C made the sample indestructible by our tests.
4. Very thorough leaching with 1 N. HCl and washing with water failed to destroy the natural stability of Catalina clay aggregates.
5. Catalina clay subsoil stability was not influenced by growth of green slime mold on road bank.

Table 1.--Comparison between four soil profiles in relation to cation exchenge capacity and organic matter activity

Depth Inches	pH Units	Organic Matter %	Exch. Bases me/100 gms.	Exch. H me/100 gms.	Unsaturation %	Cation Exch. with Org. matter me/100 gms.	Cation Exch. Without* Org. matter me/100 gms.	Exch. due to Organic matter % of total	Exch. due to Organic matter me/100 gms.	Apparent Exch. capacity for Org. matter me/100 gms.
Profile No. 1 - Santa Isabel clay - Sampled at Lajas Sub-Station										
0-3	7.00	4.72	54.85	00	0.00	54.85	41.13	25.01	13.72	290
3-6	6.85	3.69	55.43	1.37	2.41	56.80	43.09	24.14	13.71	370
6-12	6.93	2.93	58.69	1.54	2.56	60.23	52.90	12.17	7.33	250
18-36	7.10	1.22	55.53	1.27	2.23	56.80	54.85	3.40	1.93	
Profile No. 2 - Jacana clay - Samples at Lajas Sub-Station										
0-3	7.70	3.83	Soil is calcareous throughout the whole profile	-	Free $CaCO_3$	41.13	39.18	4.74	1.95	51
3-6	7.95	2.93		-		42.11	40.15	4.65	1.96	67
6-12	8.00	1.80		-		32.81	29.38	10.45	3.43	190
12+	8.15	.89		-		24.48	22.50	8.09	1.98	222
Profile No. 3 - Utuado loam - Sampled at Rullan's Farm										
0-6	5.85	1.29 (0.06N)	8.52	2.25	20.89	10.77	10.53	2.23	.24	18.6
6-12	5.80	.34	8.62	1.17	11.95	9.79	9.79	-	.00	-
12-24	6.00	.04	14.00	1.77	11.22	15.77	15.67	-	.10	250
24-48	6.30	.02	16.06	.59	3.54	16.65	16.65	-	.00	-
Profile No. 4 - Utuado loam (special clay) - Sampled at Rullan's Farm										
0-6	5.00	1.17	12.62	6.11	32.62	18.73	16.65	11.10	2.08	178
6-12	5.65	.46	11.98	2.71	18.45	14.69	14.03	4.49	.66	143

(*) Organic matter destroyed by repeated treatment with 10% H_2O_2 heated to 65° C.

Table 2.--Comparison between Mucara silty clay loam samples from two different places with special attention to the organic matter activity and its relation to cation exchange capacity.

Las Ochenta Sample

Depth Inches	pH Units	Organic Matter %	Total Bases me/100 gms (Kappen)	Exch. bases me/100 gms.	Exch. H+ me/100 gms.	Percent Unsaturation	Cation Exch. with Org. matter me/100 gms.	Cation Exch. without Organic matter me/100 gms	Exch. due to Organic matter % of total	Exch. due to Organic matter me/100	Exch. capacity for Org. matter me/100 gms.
0-3	5.30	4.78	44.60	22.80	8.05	26.09	30.85	22.03	28.59	8.82	184
3-7	5.10	3.86	41.00	23.14	7.34	24.08	30.48	24.48	19.68	6.00	155

Barranquitas' Samples

0-6	5.55	4.84	50.00	22.12	8.85	28.57	30.97	22.44	27.54	8.53	176
0-6	5.95	2.46	40.70	20.75	4.95	19.26	25.70	21.15	17.70	4.55	185

Table 3.--Relation between clay minerals and water retention at two pF values in some Puerto Rico soils

Soil Types Surfaces	Major clay minerals identified X Rays	Moisture** at 2.7%	Moisture at 4.2 %	Water Available (pF 2.7 to 4.2) %
Juncos clay	Montomorrillonite-kaolinite	26.2	16.7	9.5
Aguirre clay	Beidellite	36.6	20.0	16.6
Guanica clay	"	32.4	17.9	14.5
Cabo Rojo clay	"	20.5	11.8	8.7
" green sub-soil clay	"	45.4	26.9	18.5
Jacana clay	"	31.7	13.5	18.2
Mucara silty clay loam	"		14.3	
Fraternidad clay	"	24.3	12.2	12.1
Mabi clay	Illite-kaolinite	28.7	13.8	14.9
Descalabrado silty clay loam	Illite	14.4	7.3	7.1
San Anton clay	Illite, kaolinite, chlorite	17.0	10.0	7.0
Paso Seco silty clay	Kaolinite, illite	17.8	8.1	9.7
Santa Isabel clay	Kaolinite, illite	13.1	9.2	3.9
Pandura sandy clay loam	Kaolinite	8.6	4.8	3.8
Las Piedras clay laom	"	10.7	5.6	5.1
Teja loam	"	10.7	5.4	5.3
Vivi sandy laom	"	13.9	7.8	6.1
Utuado loam	"	10.4	7.8	2.6
Matanzas clay	"	23.9	21.4	2.5
Coto clay	"	16.8	10.4	6.4
Los Guineos clay	"	13.3	5.4	7.9
Rio Piedras clay	"	29.7	26.4	3.3
Tanama stony clay	"	9.8	9.4	.4
Coloso clay	Not identified	28.4	17.8	10.6
Toa silty clay loam	"	24.8	17.0	7.8
Alonso clay	"	24.2	16.0	8.2

** pF values ran by Mr. Servando Silva.

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Rainfall for the first 29 days of the month totaled 0.99 inch. The moisture content of the soil reached a minimum for the year prior to the 1.19 inch rain of August 30-31. Soil moisture in the 7-inch depth of topsoil of some cornfields was less than 7 percent by volume - near the wilting point. Soil moisture in mulch cornfields (residue from disked sod) in former years was consistently greater than that in the plowed cornfields. This year this difference is not apparent. This year, for the first time, we have a better stand of corn on mulch fields than on the plowed. This was due to increased planting rate and to generally favorable germination conditions. In cornfields where the mulch was applied on the ground early in July, the moisture differences were very noticeable, as follows:

Soil moisture (percent by volume) in corn strips - mulched in July vs. bare. Sampled August 24, 1950

Soil depth (inches)	Treatment	
	Bare	Mulch
0-7	19.0	23.0
7-14	22.8	24.4

"The mulch referred to in the above table was spoiled hay spread on the corn strips by hand. It was extremely effective in reducing evaporation and in maintaining a porous soil surface. Although this process involved hand labor, many farmers touring this Station did not feel that it was an objectionable method except for very large areas. It appears that mulch from sod residues loses much of its effectiveness late in the corn season. It is excellent for early protection. Hay or straw mulch, on the other hand, should probably be applied after cultivation is finished (at lay-by time)."

"Saturation deficiency in the 7 inches of topsoil in corn land on August 28, was about 3 inches. From 0.82 inch of rain on August 30, runoff resulted as follows:

Contour corn = 0.05 inch
Straight row corn = 0.19 inch

"Although the topsoil could absorb 3 inches of water before becoming saturated, only 0.77 and 0.73 inch of water was absorbed in the respective areas. Had not the soil surface been sealed, all of the rain water would have been taken up by the soil.

"R. E. Youker and F. R. Dreibelbis have prepared a report on 'An Improved Soil Moisture Measuring Unit for Hydrologic Studies." This covers the presentation of a need for a device (electrical resistance) which will be sensitive to moisture changes in the wet range (field capacity to saturation) as well as the dry range - down to wilting point. Also covered is a description of the new device which combines the advantages of fiberglass and gypsum blocks. Calibration curves show the range of its sensitivity. These units have been used for 2 years and have given satisfactory results."

Hydrologic Studies - R. W. Baird, Blacklands Experimental Watershed, Waco, Texas.-"Weather has continued hot and dry at the Project for the month of August. Total rainfall at rain gage 69 for the month was 0.08 inch, and the total for the year through August is 16.76 inches compared to a normal of 24.01 inches. Rainfall through this vicinity has been very spotted with a number of heavy showers within a few miles of the Project headquarters. At rain gage No. 14, about 3 miles northeast of Project headquarters and in the Station D area, total rainfall has been 19.91 inches through August with most of the difference occurring during July and August rains. On the Project all fields and pastures are extremely dry. The grass in pasture meadowlands has ceased to make any growth, and the cotton has opened prematurely because of lack of moisture.

"In spite of the dry weather crops have made fair progress, the hot, dry weather tending to control insect damage in cotton fields. Some harvesting of cotton has been started and will progress rapidly during the month of September. The harvesting of corn has been started and will be continued as rapidly as possible. Until there is some rainfall it will be impossible to prepare fields for fall planting of either small grain or legume winter cover crops, but this work will be pushed rapidly when conditions permit.

"Work has been continued on the soil-loss studies, and analyses are now in progress on the records available from Stations Y, Y-2, Y-6, Y-10, W-1, W-2, and W-10. This work is almost completed, and we should be able to draw more definite conclusions in the near future."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"The August rainfall, at the Meteorological Station, totaled 2.32 inches which was 0.64 inch below the long-time average. The 5.65 inches of rain received in July provided sufficient soil moisture to carry the corn through August, which is usually a critical dry period in this section of the country. The corn is late because of the slow start in the spring and the cool summer, which has not been inducive to fast growth. However, other than being late the corn has a good color and large ears, which will produce a good crop unless we have a frost before the corn is mature. Soil-moisture conditions have been favorable to farming operations and to the preparation of land for wheat seeding.

"Records of rainfall at our Meteorological Station were copied by the Reclamation Service, Superior, Nebr., for use in designing supplemental irrigation in South Central Nebraska. Rainfall and runoff records for various land use practices were requested by the Flood Control in Lincoln, Nebr. We were able to provide most of the data requested, but because of not having all the records compiled to date we were unable to furnish them with all the data requested. Mr. L. L. Kelly, Flood Specialist, in Lincoln, Nebr., advised us that this station was one of the few locations in the country which could furnish figures on runoff from land in conservation practices, and suggested that if at all possible our computations should be kept current."

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"At the Throckmorton Farm the June rainfall was approximately 7 inches. The 'normal' June rainfall for Lafayette is 4 inches. July had near 'normal' and August substantially below 'normal' rainfall. However, the total accumulation for the year, through August was about 43 percent above 'normal.'

"Several storms in June produced important runoff from the experimental watersheds and heavy runoff resulted from a rain of 1.4 inches on July 19."

"The runoff data are not completely compiled. However, the following tabulation showing the comparative behavior of a pair of watersheds in soybeans under the prevailing and conservation treatments illustrates the manner in which the effects of these treatments depends on soil-moisture conditions.

Comparative Runoff from Similar Small Watersheds, Under Prevailing and Conservation Treatment[1], in Soybeans, Spring of 1950
Purdue-Throckmorton Farm, Lafayette, Ind.

	Tot. runoff, in		Max. runoff rate, in/hr.	
	Prev.	Cons.	Prev.	Cons.
3/27-28	0	0.17	0	0.04
4/3-4	.54	.88	.49	.37
6/16	1.15	.94	4.75	3.67
6/18	.13	.05	.29	.11
6/18-19	.06	.01	.15	.03
6/24	1.15	1.03	8.21	5.15
7/19	.46	.06	3.23	.40

[1] Watersheds 15 and 14, respectively. Prevailing system - common fertilization practices, straight row seeding and cultivation; Conservation system - increased fertilization, increased organic residues returned to the soil, contour seeding and cultivation.

"It should be noted that early in the spring, the runoff amounts were higher from the watershed under the conservation treatment than from a similar, contiguous water shed under the prevailing treatment. This was in spite of the effect of the contoured rows and heavier residues remaining from the preceding corn crop and was probably due to a higher water table and more readily saturated soil on the conservation treated watershed. This was contributed to by naturally slower internal drainage of the soil and greater accretions to soil water (less runoff) during the preceding fall, than on the prevailing treated watershed.

"The water-table levels tended to equalize and by the time of the June 16 storm the relative runoff performance of the two watersheds had reversed. At that time, the soybeans were up 2-3 inches but had not been cultivated. Under those conditions, the residual effects of 8-years improved treatment with some minor influence of contour seeding of the beans (level planted in 40-inch rows) were sufficient to offset the naturally slightly poorer drainage of the conservation treated watershed. But, by July 19, after the beans had been contour cultivated, there was a very substantial effect of the conservation treatment to reduce both the total water loss and the peak rate of the runoff. Soil-moisture determinations on July 21, showed the soil on the prevailing treated watershed to be substantially below field capacity; while it was generally at field capacity on the conservation treated watershed.

"These data illustrate the importance of the inter-action of soil-moisture conditions and surface runoff. Much more information is needed on soil-moisture levels as affected by differences in infiltration, transmission and storage characteristics of particular soils and by depletion by evapo-transpiration, to properly evaluate the effects of land use and soil management practices on runoff and erosion."

Hydrologic Studies - G. A. Crabb, Jr., East Lansing, Michigan.-"Precipitation for the month of August, as measured by the U. S. Weather Bureau type of standard nonrecording rain gage, amounted to 4.28 inches at the cultivated watersheds, 3.40 inches at the wooded watershed, and 2.26 inches at the stubble-mulch plots. The variation in the total for the stubble-mulch plots is primarily due to a lost record occurring there. These amounts are approximately 152 percent and 1.21 percent of the 50-year average August precipitation of 2.82 inches for the cultivated and wooded watersheds. August precipitation can be expected to equal or exceed 4.28 inches once in 4.5 years.

"Michigan Teachers of Vocational Agriculture met in conference at the college August 2 - 4. The afternoon of August 3 was spent at the cultivated watersheds examining the instruments and evaluating soil and water losses under different crops. It is felt that this is a particularly important group in shaping farmer opinion, so considerable effort was made to see that they got a clear and accurate picture of erosion producing practices and the controls therefore.

"August 14 - 16, the Station Supervisor attended an informal conference at the Ohio Agricultural Experiment Station, Wooster, Ohio, which was sponsored by the Coke-Oven Ammonia Research Bureau, plant nutritional experts and graduate students from Cornell University, Pennsylvania State College, Ohio State University, The University of Illinois, and Purdue University attended this conference, as did representatives of the fertilizer industry and other specialists. Speakers included Dr. A. L. Kenworthy, Michigan State College, who spoke on nutrient-element balance; Dr. J. D. Sayer, Ohio Agricultural Experiment Station, talked on the effect of nutrients on the plant; Dr. Roger Bray, University of Illinois, tissue testing; and the Station Supervisor, spoke on soil moisture. The program was well received, and many sub-conferences were held on different phases of the work. The program of research, actual and prospective, on soil moisture in Michigan was reviewed for representatives of the Coke-Oven Ammonia Research Bureau, the National Potash Institute, and the National Fertilizer Association with considerable interest being manifested on their part. Tentative plans were made for an on-the-spot review of this work during the month of May 1950, with Dr. Malcom McVickar, Chief Agronomist of the National Fertilizer Association, Mr. Warren Huff, Coke-Oven Ammonia Research Bureau, and Dr. George Hoffer, Midwest Representative of the National Potash Institute, to go over the work in the field."

Hydrologic Studies - A. W. Cooper, Auburn, Alabama.-"The August rainfall of 3.68 inches represents 78 percent of the 69-year average of 4.71 inches for Auburn.

"In cooperation with the SCS Operations personnel, 16 infiltration measurements were made with the simulated rainfall type-F infiltrometer (table 1) and 17 infiltration measurements were made using the infiltration rings (table 2). These tests were made in Autauga, Dallas, Perry, Greene, Sumter, Marengo, and Mobile Counties on Cahaba F.S.L. and Wickham F.S.L., Sumter clay and Bell clay, Akron F.S. L. and Vaiden F.S.L., alluvial undiff., Tuscumbia clay, Catalpa clay, and Faceville F.S.L., respectively. Determinations were also made of field capacity and wilting points of 9 soils (table 3). Permeability and volume-weight measurements were also made and are in process of being calculated. Mechanical analyses will be made when sufficient laboratory assistance is available.

"Mr. Cooper spent August 21 and 22 in the Wiregrass District attending a water disposal training school for the work unit conservationists of that District. The training session was led by Mr. Carnes, Regional Engineer, Mr. Sanders, Drainage

Table 1.—Summary of infiltration tests made with the infiltrometer on Alabama soils (August 1950)[1]

Test No.	Soil type	Soil surface condition	Depth of top soil	Infiltration: Total 1st hr.	Infiltration: Total 2d hr.	Infiltration: Rate at end of 1st hr.	Infiltration: Rate at end of 2d hr.	Initial soil moisture: Depth (in.) 0-6	6-12	12-18	18-24
			in.	in.		in./hr.		percent			
20, 21	Cahaba F.S.L.	Poor grass sod	6	1.49	0.94	1.51	1.58	8.3	10.9	12.3	14.1
22, 23	Wickham F.S.L.	good grass sod	6	1.43	.93	.97	.73	8.7	9.2	11.1	13.6
24, 25	Sumter C.	Good grass sod	6	1.40	.16	.60	.09	24.4	23.6	23.5	24.4
26	Bell C.	Good grass sod	12	1.33	.01	.15	0	31.4	31.5	32.2	34.9
27, 28	Akron F.S.L.	Lespedeza (sericea)	3	1.65	.68	1.38	.30	11.2	19.1	20.2	18.5
29, 30	Vaiden F.S.L.	Good grass sod	6	1.58	1.66	1.78	1.57	4.4	7.8	10.0	17.1
31, 32	Alluvial undiff.	Good grass sod	6	.70	.21	.27	.12	14.5	20.7	19.2	20.0
33	Tuscumbia C.	Poor grass sod	6	[2]1.51	2.05	2.14	1.60	15.1	18.2	25.3	26.8
34	Catalpa C.	Good grass sod	6	[2]1.34	[2]1.50	1.60	1.24	24.8	26.1	33.6	34.7
35	Faceville F.S.L.	Good grass sod	6	.69	—	.13	—	7.3	7.5	8.5	10.7

[1]Data obtained jointly by S.C.S. Research and Operations.

[2]These values represent the entire quantity of rainfall applied to the plots during that period and are less than the true infiltration capacities. In test No. 33 runoff started at the end of 1 hour and 40 minutes. Test No. 34 was continued for 3 hours and no runoff occurred.

Table 2.--Summary of infiltration tests made with the infiltration rings on Alabama soils (August 1950)[1]

Test No.	Soil type	Soil surface condition	Depth of top soil	Infiltration: Total 1st hr.	Infiltration: Total 2d hr.	Infiltration: Rate at end of 1st hr.	Infiltration: Rate at end of 2d hr.	Initial soil moisture: Depth (in.) 0-6	6-12	12-18	18-24
			in.	in.		in./hr.		Percent			
11, 12	Cahaba F.S.L.	Poor grass sod	6	8.75	7.57	7.57	6.82	8.3	10.9	12.3	14.1
13, 14	Wickham F.S.L.	Good grass sod	6	2.01	1.03	1.17	1.00	8.7	9.2	11.1	13.6
15	Sumter C.	Good grass sod	6	.81	.28	.28	.28	24.4	23.6	23.5	24.4
17	Bell C.	Good grass sod	12	.16	0	0	0	31.0	31.5	32.2	34.9
18, 19	Akron F.S.L.	Lespedeza (sericea)	3	2.32	.88	1.09	.76	11.2	19.1	20.2	18.2
20, 21	Vaiden F.S.L.	Good grass sod	6	3.73	3.30	3.25	3.25	4.4	7.8	10.0	17.1
22	Alluvial Undiff.	Good grass sod	6	1.25	.70	.65	.65	14.5	20.7	19.2	20.0
24, 25	Tuscumbia C.	Poor grass sod	6	[2]13.87	--	3.45	--	15.1	18.2	25.3	26.8
26	Catalpa C.	Good grass sod	6	[2]95.37	--	63.12	--	24.8	26.1	33.6	34.7
27	Faceville F.S.L.	Good grass sod	6	1.01	.33	.47	.26	7.3	7.5	8.5	10.7

[1] Data obtained jointly by S.C.S. Research and Operations.

[2] In tests Nos. 24, 25, and 26 the soil had a large number of cracks. The entire field was cracked, and it was impossible to find a place 22 inches in diameter that contained no cracks.

Table 3.--Field capacity and wilting point determinations of Alabama soils (August 1950)[1]

Soil type	Location county & farm	Depth in.	Field capacity 1/3 atmos % (dry basis)	Wilting point 15 atmos % (dry basis)
Cahaba F.S.L.	Autauga - Dutch Bend	0-6	10.9	5.9
"	" " "	6-12	12.3	7.5
"	" " "	12-18	12.0	7.7
"	" " "	18-24	14.0	9.3
Wickham F.S.L.	" " "	0-6	11.6	3.1
"	" " "	6-12	14.7	8.2
"	" " "	12-18	15.8	10.7
"	" " "	18-24	16.8	10.0
Sumter Clay	Dallas - Caley	0-6	27.8	17.1
"	" "	6-12	25.0	15.7
"	" "	12-18	22.8	14.5
"	" "	18-24	23.1	13.8
Bell Clay	" "	0-6	39.9	27.6
"	" "	6-12	42.0	26.4
"	" "	12-18	40.5	24.7
"	" "	18-24	44.2	28.4
Akron F.S.L.	Perry - Devall	0-6	16.2	11.2
"	" "	6-12	20.8	16.3
"	" "	12-18	19.4	15.5
"	" "	18-24	20.2	15.8
Vaiden F.S.L..	" - Brady	0-6	11.3	4.5
"	" "	6-12	13.3	5.4
"	" "	12-18	14.8	7.5
"	" "	18-24	21.2	15.5
Alluvial Undiff.	Greene - Ward	0-6	13.4	8.6
" "	" "	6-12	21.5	11.2
" "	" "	12-18	13.5	6.9
" "	" "	18-24	21.1	10.9
Tuscumbia Clay	Sumter - Stickney	0-6	20.6	12.2
" "	" "	6-12	21.7	11.5
"	" "	12-18	25.8	16.4
"	" "	18-24	27.8	17.6
Catalpa Clay	Marengo - Spencer	0-6	33.0	25.9
"	" "	6-12	37.9	28.4
"	" "	12-18	38.7	31.6
"	" "	18-24	38.4	29.4

[1] Data obtained jointly by S.C.S. Research and Operations.

Engineer, Mr. Ritchie, Soil Scientist, and Messrs. Roberts and Frederick, Zone Conservationists. Mr. Medlock was present as Acting Chief of Operations and Mr. Newman, Assistant State Conservationist, represented the State Office.

"Messrs. Kummer, Cooper, Richardson, and Conniff attended the water disposal training school held in the East Alabama District August 23 through 25th, led by the same group named above. On August 25 a group from the Soil Conservation Service (Operations and Research), the Alabama Agricultural Experiment Station, and the Alabama Extension Service met and appointed a committee of four representing these agencies to study the engineering phases of water disposal and make recommendations for Alabama. The committee consists of Messrs. Kummer, Chairman, Ennis, Sanders, and Cooper."

Hydrologic Studies - T. W. Edminster, Blacksburg, Virginia.-"The Flood Control staff in Staunton have again requested assistance in the study of the application of certain analytical methods for determining flood flows in a conference held at Winston Salem, N. C. Messrs. Holtan and Edminster discussed with Messrs. Chambers, Carnes, Green, Jones, and Warner possible methods of approach to the problem. It was decided that Mr. Holtan would be given an opportunity to go over procedures now in use by the Flood Control staff and then apply certain procedures which he and Mr. Kirkpatrick have recently developed. It is anticipated that through the joint study of the two methods some of the problems that are being encountered can be solved."

Hydraulic Studies - W. O. Ree, Stillwater, Oklahoma.-"During August channels were made ready for the fall testing. Profiler sockets and datum bolts were installed on FC-8 and FC-25. Both of these are new channels not previously tested. The sockets and supports for the channel cross-sectioning apparatus are set in concrete. This provides the necessary rigidity and permanence.

"Channel FC-26 was completed during the month. The topsoil which had been stripped from the site prior to shaping the channel was moved back on to the finished subgrade. The channel was brought to finish grade and cross section. Temporary protection to the channel is being provided by a heavy planting of Sudan grass (70 pounds per acre) and an application of hay mulch (2 tons per acre). The approach to the channel below the entrance gate has been sodded to Bermuda grass.

"The East dyke has been extended to where it will intercept the waste flows from blocks D and F. These flows will now be diverted into the concrete flume to be discharged into the creek. The bottom meadow between the dyke and the test channels was also regraded to provide better drainage."

Hydraulic Studies - D. A. Parsons, Minneapolis, Minnesota.-"Test facilities were constructed and calibration tests made on a 1-ft diameter runoff sampler in a continuation of the study of the Coshocton-type sampler. Completion of these tests permitted comparison of the behavior of three sizes of sampler having essentially the same design.

"The proportion of the total flow extracted by a sampler varied between about 15 percent greater and 10 percent smaller than the intended catch, depending upon the discharge. The variations within this range were quite similar for the three sizes of sampler at like proportions of capacity."

"Plans for the construction of the 2-foot diameter sampler were completed. A considerable amount of time was also spent in the recalculation and transcription of the results of the tests for the purpose of record.

"While revising a manuscript concerning the speeds of transportation of sand grains, an additional study was made of the necessary conditions for the maintenance of rolling of non-spherical particles. The data showed that the bed shear stress required to maintain rolling of sand grains over a smooth bed was independent of the size of the particle, over a considerable range in grain size. This applies to a water depth at least two times the grain diameter and to particles with nominal diameters from 2/3 mm to 1/7 mm. The latter size was the smallest that was used in the study. The tractive force required to maintain rolling of larger particles decreased with increasing grain size.

"Absence of an adequate theory about this particular phase of sediment transportation precludes extrapolation of these observations beyond the size range studied. The largest size used was 2 mm. The flow was laminar."

Supplemental Irrigation - T. W. Edminster, Blacksburg, Virginia.-"Mr. J. N. Jones under TVA Contract with the Experiment Station makes the following report:

"The total rainfall for the month at the irrigation control plots was approximately 3.95 inches.

"The pasture irrigation system was operated from August 7-23 completing the last four settings of the third application of 1-1/2 inches of water, and 14 settings of the fourth application before being stopped by sufficient rainfall.

"An application of 0.6 inch was applied on the corn plots receiving irrigation at 75 percent field capacity on August 4.

"On August 7, three corn plots receiving irrigation at 50 percent field capacity and one tobacco plot received an pplication of 1.2 inches. On August 9 the 75 percent plots received another application of 0.6 inch.

"Two plots receiving irrigation at 25 percent field capacity were given an application of 1.8 inches on August 12."

Supplemental Irrigation - J. R. Carreker, Athens, Georgia.-"Rainfall in August totaled only 2.20 inches, or 2.38 inches below the normal or 4.58 inches. Of this 2.20 inches, 1.07 inches fell in showers during the last 5 days.

"Soil moisture was adequate the first half of the month from rains the last of July, but became progressively deficient toward the middle of the month. Showers of 0.38 and 0.48 inch on the 18th and 19th helped the soil-moisture supply.

"Evaporation from the pan totaled 5.94 inches and 924 miles of wind movement were recorded.

"Irrigation applications made during the month included:

Aug. 10 - Summer pasture
15 - Fescue grass pasture
16 - Newly planted sweet corn (to obtain a stand)
23 - Crimson clover and rye grass planting
25 - Sweet potatoes
29 - Late sweet corn

"The vegetable harvests were completed except for the tomatoes on the lowland plots. Yields recorded were:

Vegetable	Site	Unirrigated lb/ac	Irrigated lb/ac	Difference percent
Lima beans	lowland	3,597	2,967	-16.4
Lima beans	upland	3,513	3,218	- 8.4
Snap beans	lowland	2,529	4,460	plus 76.4
Snap beans	upland	2,583	6,025	plus 133.2
Tomatoes	upland	16,128	25,854	plus 60.3

"There was some increase in weeds on the irrigated lima beans which probably accounted for much of the loss in yield with irrigation. Such things as bloom set, disease and insect control seem to be more critical factors than deficient soil moisture with the lima beans.

"Most of the unirrigated snap beans were of poor market quality, while those irrigated were of excellent quality.

"Results from the sweet corn roasting ears treated for earworm control as described in the July report were as follows:

Treatment	Corn ears Infested with worms
DDT applied with pressure sprayer	19.2%
DDT " through irrigation sprinklers	35.1%
No treatment	39.5%

"Unless better techniques of application are possible we do not see any justification in the claim that irrigation sprinklers can be used for applying insecticides for corn ear worm control.

"Professor Joel Giddens, In Charge, Soil Testing Laboratory, Soils Department, tested the soils and sweet corn plants in the area treated with RA-PID-GRO (reported in July). Both the soils and plant tissue tests indicated good quantities of nitrogen, phosphorous and potash elements in this area where the liquid fertilizer was applied through the irrigation sprinklers."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Rainfall was fairly well distributed throughout the month. From August 12 to the 17th very few showers occurred. Rainfall for the area varied from 4.7 to 11.62 inches with an average of 7.47 inches. This is about average for the month since our gages have been in operation.

"In general there has been a slow increase in the water table during the entire period with the exception of readings on August 7 when losses up to two tenths of a foot were recorded in the lower to middle portions of the area.

"With rainfall quite general throughout the area most of the month, readings of the moisture blocks remained low. Physically, a definite change can be noted in the soils in the various treatment plots. The soil material under the shavings mulch has little or no organic matter in it while the soil material under the pine straw and grass has a great deal of organic matter in it. We shall try to make some determinations of total organic matter in these various plots soon to see what differences have occurred."

Drainage Studies - Charles B. Gay, Fleming, Georgia.-"This month concludes one year since the activation of this Station. It, therefore, seems fitting that this report should summarize in a general way the activities for the year.

"During the year we have not only accomplished a great amount of work in the field, but have been very busy at the same time with continuous planning. The fact that we are starting work in an area where there is very little agriculture and hardly anything is known about the soils, has necessitated frequent changes in our plans. Strong recognition is due Harry G. Ukkelberg for his untiring efforts and outstanding conduct of the land clearing and preparation as well as his sound planning. Bettie Stebbins is to be highly commended for her devoted interest and the splendid progress that she has made in handling the heavy load of administrative work.

"The Fleming Tract, 180 acres in size, was purchased by Liberty County, in October 1949 and deeded to the Soil Conservation Service. Planning and land clearing was immediately started. Due to a lack of equipment, the land clearing was not begun in a material way until March of this year. In clearing this land the commercial timber was first removed; then the brush and remaining trees were cut, and hauled to specified areas for burning; following this the stumps were pushed out of the ground and they were hauled to these areas for burning; and finally the stump holes were filled and the land harrowed several times. The present status of the land clearing is as follows:

150 acres with brush removed
125 acres with stumps pushed and hauled
40 acres harrowed
10 acres cleared with stumps left
25 acres not cleared (branch)
20 acres wood lot

Drainage Studies - Ellis G. Diseker, Raleigh, North Carolina.-"In addition to the tabular data given in the June Progress Report for the control of Aquatic plants, it was also mentioned that several other chemicals were applied 16 hours prior to a series of heavy and continuous rains. Data for the chemicals applied on June 28, are listed in table 1.

"On August 29, different amounts of Estrone No. 245, and Estrone No. 44, also a mixture of each, were applied to the aquatic plants in the McRae Canal. The maximum flow of water in the canal was only about 6 feet per minute, and the depth ranged from 2 to 12 feet. From 1/2 to 3/4 inch of the plant tops were above the surface of the water. The results of this application will be reported in September.

Drainage Studies - I. L. Saveson, Baton Rouge, Louisiana.-"Test runs were made on cutting the ditches on the previously reported precision graded area for drainage. The machine was cutting new ditches 32 inches deep with 52-inch top and 20-inch bottom. On heavy black soil, the machine averaged 7.7 feet per minute and 10 feet per minute on light soil. The impeller shredded the earth and trash and spread approximately 25 percent of the earth, placing the balance in a roll 15 feet from the ditch where it will be easily accessible for dozer and scrapers to spread it."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-"Mr. Walter Turner, Soil Scientist, makes the following report:

Table 1.—Chemical control of aquatic plants, Plymouth, N.C.

Chemical mixtures	Date of application	Date and amount of rainfall	Date of inspection	Name of plants	Percent of top killed	Percent of roots killed	Plant Characteristics
T.C.A. 90% (5 lbs. per 4-gal. of water.)	6/28/50	6/29/50 2.5 inches Total of 6" in 5 days	7/20/50	Paese Loose Strife (Ludwigilia Palustrius)	0 Plants partly submerged	0 All roots submerged	Leaves 1" diameter, green and purple prostrate
T.C.A. 90%	6/28/50	6/29/50 2.5 inches Total of 6" in 5 days	7/20/50	Penny wort (Hydrocetle Umbellate)	0 Most of plants submerged	0 All roots submerged	Leaves 1-1/2" diameter, green in color, semi-prostrate
T.C.A. 90%	6/28/50	6/29/50 2.5 inches Total of 6" in 5 days	7/20/50 7/20/50	Burr Reed (Sparganium)	40 Partly submerged	30 All roots submerged	Leaves 5/8 x 18" resembles a lily.
T.C.A. 90%	6/28/50	6/29/50 2.5 inches Total of 6" in 5 days	7/20/50	Rush (Uncus Effusus)	100	100 Some of roots submerged.	Round blades 1/8 x 18", dark green, pointed top
Commercial Paint thinner (Full strength)	6/28/50	6/29/50 2.5 inches Total of 6" in 5 days.	7/20/50	Paese Loose Strife (Ludwigilia Palustrius)	Only singed tops of lilies	None	Leaves 1" diameter, green and purple, prostrate
1 Gal. Motor Oil 1 Gal. Paint Thinner 1 Gal. Water	6/28/50	6/29/50 2.5 inches Total of 6" in 5 days	7/20/50	Penny wort (Hydrocotle Umbellate)	Only singed tops of lilies		Leaves 1-1/2" diameter, green in color, semi-prostrate.
Estrone No. 245 (6 oz. per 4-gal. of water)	6/28/50	6/29/50	7/20/50	Burr Reed (Sparganium)	Killed 80% of lilies only	Killed 80% of lilies only	Round blades 1/8 x 18", dark green, pointed top

NOTE - Chemicals were applied 16 hours prior to a series of heavy rains. Plants were submerged within 30 hours after chemicals were applied and remained under water for about 2 weeks. This was the second application (of T.C.A. 90%) on the rushes; the most of which had recovered from the first application.

"In my monthly report for October 1949, I wrote: 'The moisture equivalent determinations mentioned were compared to the corresponding percentage of moisture after 15 hours on the plate. There is a linear correlation with unity slope and an X intercept of 2.5 inches. Additional data including the moisture equivalent determinations on loose field samples reported in table 1 have been included with the original data and the following relationships worked out (n = 48).

Let X = percentage of moisture after 15 hours

and $\hat{Y}$ = regression moisture equivalent

Then $\hat{Y} = -3.5 + 0.98\ X$

The 95 percent fiducial limits of b are:

$l_1 = 0.72$; $l_2 = 1.24$

$r = 0.961$ ($l_1 = 0.931$; $l_2 = 0.978$)

"On the basis of the present procedures it appears that for practical purposes moisture equivalent could be estimated from the percentage of moisture remaining in the soil after 15 hours under 60 cm tension.

"After the given equation was worked out, $\hat{Y}$ was found for the subsequent sites on which moisture equivalent was determined. The results are given in table 2.

"This material as prepared by Mr. Turner appears to have a number of rather important implications. If it continues to stand up under further tests, it should make possible the use of present data now on hand from the permeability studies and eliminate the need for further moisture equivalent determinations based on centrifuging.".

Sedimentation Studies - Russell Woodburn, State College, Mississippi.- "The greater portion of the month was concerned with plans and preparations for the Sedimentation Conference.

"Our research office at State College worked throughout the month on various calculations which were planned for use during the conference. Calculations were made for bedload transport and for total transport of bed materials for a 50-foot wide flat sandbed and for a 300-foot wide flat sandbed under varying bank conditions. It was assumed that bank friction would amount to an 'n' value of 0.045 and the banks were at various slopes including vertical, 1:1 and 2:1. These calculations were made for the purpose of pointing out difficulties encountered in attempting to arrive at figures for total sand transport when there are uncertainties present in the method of applying the angle of banks or the roughness of banks. Calculations were also made demonstrating the effect of slope on sand transport as well as the effect of variation in the representative grain diameter of bed material on sand transport.

"The conference begin at Winona, Mississippi, August 28, and a field tour was made in Carroll County and adjacent areas on August 28 and 29. There were approximately 20 members present representing the following agencies: Soil Conservation Service, Research; Soil Conservation Service Flood Control from Mississippi, Spartanburg, S. C., and Lincoln, Nebr.; Corps of Engineers, Omaha, Nebr., and Vicksburg, Miss.;

Table 1.--Moisture equivalent from loose field samples used in the determination of the regression equation

Site No. Va.	Soil type	Either soil horizon or depth of sample core	Moisture equivalent
129	Sassafras fsl	A	8.4
"	" "	B	14.0
166	" "	2-5"	11.2
"	" "	16-19"	12.4
172	Appling sl	A (0-10")	4.7
"	" "	A (10-15")	8.3
"	" "	B	17.8
"	" "	C	22.0
178	Cecil sl	A	10.8
"	" "	B	35.2
213	Davidson cl	0-8"	31.2
"	" "	8-33"	34.6
218	Chester l	1-4"	17.4
"	" "	10-13"	18.7
"	" "	20-23"	19.4

Table 2.--Moisture equivalent and Y from sites run after the regression equation was determined

Site No. Va.	Soil type	Soil horizon	Moisture after 15 hours %	Moisture equivalent[1] %	Y %
141	Cecil fsl	A_2	22.8	12.2	17.8
		B_2	31.5	27.8	27.4
		B_3	34.2	29.6	30.0
237	Lloyd l	1-4"	20.7	18.6	16.8
		7-10"	31.6	29.1	27.5
		21-24"	46.2	40.8	41.8
241	Norfolk (heavy) fsl	A_3	13.2	9.4	9.4
		B^3	18.8	13.5	14.9
		C	23.1	18.1	19.1
242	Lenoir vfsl	A	15.5	6.0	11.7
		B_1	15.7	11.2	11.9
		B_2^1	19.3	13.3	15.4
		C^2	18.7	13.6	14.8
245	Lloyd l	A	27.4	21.4	23.4
		B	31.1	26.6	27.0
246	State fsl	A	24.5	15.5	20.5
		B	23.8	21.5	19.8
252	Staser l	0-14"	25.5	21.6	21.5
		14"/	22.0	21.1	18.1
253	Sequatchie l	1-4"	26.5	19.2	22.5
		17-20"	21.3	18.0	17.4
254	Sequatchie sl	1-4"	15.7	9.1	11.9
		10-13"	13.9	15.1	10.1
		16-19"	17.0	13.5	13.2
255	Sequatchie sl	1-4"	22.2	14.9	17.3
		14-17"	17.5	13.2	13.7
261	Irrigation Plots	1-4"	23.1	18.2	19.1
		13-16"	17.0	14.7	13.2
262	" "	1-4"	22.2	18.5	18.3
		7-10"	22.4	21.0	18.5
		22-25"	33.3	30.5	29.1
263	" "	1-4"	23.7	19.8	19.7
		16-19"	29.2	25.8	25.1
		26-29"	35.2	32.9	31.1
264	" "	1-4"	20.9	18.5	17.0
		10-13"	32.0	29.6	27.9
		24-27"	43.3	38.1	38.9

[1]Centrifuge method of moisture equivalent according to the procedure published by ASTM-D-425-39 for sub-grade soils.

U. S. Geological Survey, Lincoln, Nebr., and Bureau of Reclamation, Denver, Colo., and Dr. H. A. Einstein of the University of California. The points visited in the field included areas showing sand damage in the Bluff Line streams of the Yazoo Watershed and some of the treatment measures being used by the Flood Control Section of Soil Conservation Service.

"The group moved to State College, Miss., for an office conference on August 30 and 31. With the exception of a part of the representatives of the Corps of Engineers, Vicksburg, Miss., the same group was present for office studies as were present in the field."

IRRIGATION AND WATER CONSERVATION DIVISION

Water Spreading for Recharge of Underground Basins - A. T. Mitchelson, Dean C. Muckel, Leonard Schiff, E. S. Bliss, Curtis E. Johnson.-San Joaquin Valley. "A statement regarding the Joint Investigation of Water Spreading in San Joaquin Valley, containing a brief discussion of the history, present status, and outline of proposed work for the immediate future, was prepared for the cooperators. Conferences were held with Mr. George Henderson, Chief Engineer of the Kern County Land Company and his staff regarding the project. The Friant-Kern Canal, through which water for spreading will be available, is now into Kern County and passes approximately one mile from our experimental plots near Wasco.

"During the month of August, organic matter decompositon studies were continued and rates of decomposition were computed for a 60-day period of decomposition.

"A series of percolation experiments were set up to test the effect on percolation rates of placing gin trash mixed with soil at various depths in percolation tubes. One group of tubes contained gin trash mixed with soil throughout. One group had gin trash mixed with soil in the top half and soil in the bottom half. A third group had soil in the top half and gin trash and soil mixture in the bottom half. A fourth group contained soil throughout the entire length of the tube. During the initial run, which is still being continued, all tubes containing gin trash dropped rapidly to a percolation rate below that of the untreated soil. This initial run is designated as an incubation period, which will be followed by a drying period and another test run.

"Another test is being run in conjunction with that mentioned above. In this test percolation tubes are given the same incubation period, but instead of the material in the tubes being continuously submerged, they are flooded twice weekly and allowed to drain. These tubes will also be dried and given a test run after the incubation period is completed. The purpose of these various tests is to determine the placement of gin trash in the soil and the method of incubation which is most effective in maintaining a high percolation rate."

Friction Losses in Pipes and Fittings - Carl Rohwer, Ft. Collins, Colorado.-"Copies of Technical Bulletin 41, Friction Losses in Selected Valves and Fittings for Irrigation Pumping Plants, were mailed to the agencies that cooperated on the study by supplying valves and fittings for the tests. Copies were also sent to the staff of the Division of Irrigation and to others that were interested in the results."

Seepage Losses from Irrigation Channels - Carl Rohwer, Ft. Collins, Colorado.-"Observations of the losses from the seepage rings in clay loam soil at the College and sandy soil at the Bellvue laboratory were continued during August. The seepage rate for the clay loam soil has decreased from an initial rate of 6 feet per square foot per day to about 1 foot per day. The loss from the sandy soil continued at about the same rate as when the readings were started in the latter part of June.

"Permeameter readings have been taken in both sets of rings from time to time with the SCS permeameter. These tests show that readings taken immediately after the permeameter is installed are too high and that it takes more than a week for conditions to become stabilized in the clay loam soil. However, the adjustment is more rapid in the sandy soil.

"Because of the difficulty in maintaining accurate control of the flow of water wit the Bureau of Reclamation permeameter, owing to the lack of sensitivity of the Mariotte tank which is used to hold the depth constant, the apparatus was revised by substituting a float control. This float is attached to the outlet pipe and is apparently quite effective in holding the depth in the well constant. Readings taken with the revised equipment are more consistent than those formerly obtained, but they still show unexplained increases and decreases. Apparently there is an increase at night. No reason for this phenomenon can be given at this time."

Irrigation Studies - Stephen J. Mech, Prosser, Washington.-"Our corn irri gations are usually quite routine. The recording of application and runoff, howeve provided information on the infiltration changes during the irrigation. These changes in infiltration have been of considerable interest. Strangely enough, it has required 72 hours to add 3.5 inches of water to the 'wet' plots, whereas 7.5 inches were added to the 'dry' plots in about 60 hours. In addition, after the 'wet' plots run for 40 hours or so, the infiltration rate becomes so low that its just about adequate to take care of the evaporation and transpiration without adding anything to storage. We sometimes had to cut the water off from necessity to use it elsewhere. There is evidence also, that the 'dry' plots will have a lower infiltration during their next irrigation.

"These data from corn, when combined with that from alfalfa, will round out a very striking picture of the irrigation characteristics of Safemoor Fine Sandy Loam during a 7-year rotation.

"We reported in July on the growth of corn on the 'wet,' 'medium,' and 'dry' plots. We now have additional data of similar nature. We took daily height measurements on 6 stalks in each treatment. The measurement was the height of the extended foliage.

"On August 29, just before the 'dry' plots were irrigated, the heights were 5.9, 7.4, and 9.4 feet on the 'dry,' 'medium,' and 'wet' plots, respectively. On August 11, the ultimate heights were 7.4, 9.0, and 10.2 feet, respectively. These show a growth of 1.5, 1.6, and 0.8 feet, respectively. These data, together with our observations, show that corn reaches its full height at tasselling time. Retarded growth up to that time can be offset somewhat if growth conditions are improved. It seems, however, that for maximum height, growth should be as uninterrupted as possible.

"While the above deals with vegetative growth only, and may represent silage yield, the grain yield of corn may not necessarily follow the same trend.

Irrigation Studies - Ashton R. Codd, Bozeman, Montana.-"From August 13 to the 22d, a field-trip was made to upper portions of the South Fork of the Flathead River to establish four new Snow Survey Courses and arrange cooperation between the Forest Service, Bureau of Reclamation and the Geological Survey for the measurement of these and two old Snow Survey Courses at the same time as stream gaging is being done. Mr. R. A. Work, Snow Survey Project Supervisor, accompanied the writer on this trip, as did Frank Stermitz, District Engineer of the Geological Survey. Representatives of the Planning and Construction Branches of the Bureau of Reclamation joined the party at Hungry Horse. The Forst Service cooperated by aiding greatly with accommodations, transportation, and general guidance in the primitive area.

"On August 23, a field trip was made to the Boise S. C. S. office to bring all original and transcribed Snow Survey Records for comparison with the Boise Records. The necessity for this comparison was brought about by minor discrepancies accumulating in the records over the period of time from 1938 to date. During the 2 days' work, both Mr. Nelson and I became aware that this check of basic data was one of the most worthwhile projects attempted this year. Such a comparison should be made between other offices which report averages and snow data for the same courses or basins. It is planned to compare seasonal stream flow averages between the Boise and Bozeman offices before February 1."

Irrigation Studies - Clyde E. Houston, Reno, Nevada.-"Three snow courses in the southern Ruby Mountains south of Elko, Nevada, were permanently marked with iron pipe. This completes the 5-year program of marking Nevada snow courses.

"Preliminary streamflow measurements indicate excellent forecast accuracy for 1950. They are for the period April through July:

	April 1 Forecast (1000 Acre-feet)	Measured Runoff (1000 acre-feet)	Percent Error
Humboldt River at Palisade, Nevada	200	195	3
West Walker River near Coleville, Calif.	150	140	7
Carson River near Fort Churchill, Nev.	200	195	3

"Summer inspection and maintenance was made on two courses on Carson River Watershed, one on Lake Tahoe and one in the Northern Great Basin.

"Our bulletin 'Consumptive Use of Irrigation Water by Crops in Nevada' Bulletin 185, Nevada Agricultural Experiment Station was received from the State Printer and mailed to those on the Station mailing list. Additional copies are available for any who desire them.

Rainfall Penetration Studies - Upper Santa Ana Valley (San Bernardino County, Calif.).- Dean C. Muckel, Pomona, Calif.-"A reconnaissance of San Timoteo Basin was made in preparation of locating soil sampling stations for Fall soil-moisture deficiency determinations. —— Rainfall penetration in this area contributes to the ground-water supplies which are pumped from wells for irrigation of crops along the flat floors of major valleys. It appears that numerous sampling stations will be necessary throughout the basin. Ordinarily our Fall deficiency stations have been located according to crop, but in San Timoteo Basin the selection will be made according to topography.

"Total area of the basin is 28,466 acres, of which 5,200 are in citrus, 500 in residence, 2,000 in dry-land hay and grain. There are 18,000 acres of brush-covered land too irregular to cultivate. The remaining 3,000 acres consists of small plots of various types of irrigated and dry-land crops, riverwash, and roads."

Soil Moisture Characteristics - V. S. Aronovici, Pomona, Calif.-"The first step in this program was to evaluate present methods, both field and laboratory, for the measurement of soil permeability under field moisture conditions. The procedure set up for this purpose is briefly described below.

"A furrow-irrigated orchard is selected for uniform grade, soil conditions, and soil type. From the orchard is selected a representative furrow for uniformity of slope, width, and which is most likely to receive a relatively uniform supply of water during irrigation.

"One day prior to irrigation a set of soil-moisture samples are taken of the furrow section. Ninety degree V-notch weirs are set in the furrows and two 144 square inch in area single-ring infiltrometers are driven into the furrow directly adjacent to the irrigated furrow. A ponded area 3 feet in diameter is maintained around the ring infiltrometer during observation.

"During irrigation, a careful check is made of the flow of water over the first and second weir and infiltrometer observations are made concurrently with the irrigation observations. Frequent measurements are made of the area covered by water in the furrow and observations are also taken of the total width of the moistened area bordering the furrow.

"Upon completion of this run, it is believed possible to compute the rate of water intake in the furrows and the total quantity of water intake by the soil-moisture samples. These values are then compared with the infiltrometer observations and the laboratory permeability measurements. During this month one field run was completed. However, the laboratory studies and computing have not been completed.

"The V-notch weirs were designed with a standard 90 degree V. The weir proper is made of 18 gauge galvanized iron, one-sixth inch by two inches wide. Braces are bolted to the weir plate which extend back or upstream 5 inches. These braces are then bent down to form a footing for the weir and a cross bar joining the braces provides a firm footing for the hook gauge. The infiltrometers are constructed of one 8-inch galvanized iron rolled into 'but' welded rings 9 inches in height."

Imperial Valley Drainage Investigations.- George B. Bradshaw, Imperial, Calif.-"A study has been initiated to determine the water pressure in tile-drainage systems during leaching and under various applications of irrigation water.

"Piezometers were found to be very slow and time consuming in obtaining the pressures in tile-drainage systems. To speed up this study a pressure manometer gage has been built that can be quickly installed in the tile-drainage outlet. The manometer tube is affixed to a rubber covered tapered plug that can be inserted in 4, 5, 6, 8 and 10-inch outlets. The pressure in the drainage system can be obtained with this manometer gage in about 10 seconds.

"Measurements to date indicate zero to 4 inches of pressure in adequately designed drainage systems during normal irrigation periods. In underdesigned drainage systems 36 or 48 inches of pressure occurred during and after irrigations. These same underdesigned systems had 72 to 78 inches of pressure during leaching.

"Pressures in tile-drainage systems are generally undesirable for the following reasons:

1. The drainage discharge is retarded and slows down the removal of soluble salts during leaching.

2. The soils surrounding sections of the system, not under irrigation or leaching, may be impregnated with highly saline water. If pressure is excessive a salt deposit may be formed on the ground surface by capillarity and evaporation.

3. Soil around the lines is puddled which gives the tile more of a chance to slip out of alinement.

4. The water table, raised by irrigation, may remain above the root zone for a damaging period of time."

Irrigation Water Requirements - Harry F. Blaney, Los Angeles, California.- "Arizona.- In collaboration with Karl Harris, work of compiling climatological and irrigation data for estimating irrigation requirements and consumptive use of water in irrigated areas in Arizona was continued.

"Colorado.- A provision report on 'Consumptive Use and Irrigation Water Requirements of Crops in Colorado' by Harry F. Blaney and Wayne D. Criddle was mimeographed at Logan for Region 6, and is available for limited distribution.

"New Mexico.- Irrigation and consumptive use of water requirement studies in New Mexico were continued in collaboration with Eldon G. Hansen. Consumptive use coefficients (K) in the formula, U = KF = consumptive use, were set up for irrigated crops as follows: alfalfa and irrigated pastures, 0.85; grass hay, 0.75; cotton, 0.62; spring grain, and grain sorghum, 0.70; corn, 0.75; truck and vegetables, 0.70; beans, 0.60; and, orchard, 0.65.

"Colorado River Basin (Lower).- A study on consumptive use of water in the Lower Colorado River Basin, in collaboration with the U. S. Bureau of Reclamation, was continued during August. A preliminary report by the Bureau - using a modified method developed by the Division of Irrigation, SCS, in computing consumptive use - was reviewed at their request."

Water Application Efficiencies in Irrigation - Harry F. Blaney, Los Angeles, California.-"A paper entitled, 'Water Application Efficiencies in Irrigation" by Orson W. Israelsen and Harry F. Blaney, presented before the South Pacific meeting of the Section of Hydrology, American Geophysical Union in 1946, was mimeographed at Logan, Utah, after numerous requests had been received for copies. This paper reviews the results of efficiencies studies made by the Division of Irrigation in cooperation with the Agricultural Experiment Stations in California, N. Mex., and Utah."

Los Angeles West Coast Basin Studies - Harry F. Blaney, Los Angeles, California.-"The cooperative study with the California Division of Water Resources on rainfall disposal, water conservation, and consumptive use was continued during August. At the request of the State Engineer, the 14th conference of the Engineering Advisory Committee, consisting of representatives from the cities of Los Angeles, El Segundo, Inglewood, Manhattan Beach, and Long Beach; Los Angeles County Flood Control District, six oil companies, several irrigation and power companies, and the Soil Conservation Service was attended in Los Angeles on August 18. Results of studies made in 1949-50 on subsurface inflow from ocean and other areas to the Basin, and rainfall and irrigation water penetration to the ground-water supply were reviewed. The preparation of a final report was postponed until additional hydrologic data are available."

Irrigation Studies - Tehachapi Valley Soil Conservation District.- William W. Donnan, Los Angeles, California.- "Some time was spent in Tehachapi Valley making irrigation efficiency tests on seed alfalfa row crops. Soil samples were taken at the head, middle, and foot of the rows and the water applied and wasted was measured. Post irrigation soil samples were taken by the local technician. Sites were permanent pasture, and orchard grass seed crops. The crop survey for the entire Tehachapi Soil Conservation District has been completed by the Operations Work Group.

"On August 21 a conference was held in San Fernando with Carles Thomas, Engineering Specialist, and Thomas Hitel, Regional Geologist, to review the geological phases of the ground-water problem in the valley. The various sub-basins were outlined on quad sheets and tentative well sites were chosen for the three water-stage recorders."

Sprinkler Studies, Antelope Valley Soil Conservation District - G. Marvin Litz, Los Angeles, California.- "Coefficients of uniformity of distribution were computed for each sprinkler test made for the cooperative sprinkler study in the Antelope Valley Soil Conservation District. The coefficient used is the one developed by J. E. Christiansen some years ago while with the University of California, and is expressed, as a percentage, by the equation:

$$Cu = 100 \left(1.0 - \frac{\Sigma x}{mn}\right) = \text{coefficient of uniformity}$$

where x is the deviation of individual rain gage depths from the mean m, and n is the number of equally spaced rain gages observed. When the average wind velocity, in miles per hour, for each test is plotted against the coefficient of uniformity there is an indication that a correlation may exist, if a sufficient number of tests can be made. The coefficient of uniformity and average wind velocity for each test are tabulated below:

Date	Test run number	Plot I (50 x 50 ft. spacing.)		Plot II (50 x 20 ft. spacing.)	
		Cu	Wind	Cu	Wind
1950		Percent	M. p. h.	Percent	M. p. h.
July 11	1	67.5	7.2	71.1	5.1
25	1			86.9	1.5
25	2			60.9	12.5
26	1	83.4	2.9		
Aug. 2	1	82.6	5.5	94.1	.7
2	2	50.2	15.7		

Irrigation Studies - Earl W. Cowley, Grand Junction, Colorado.-"Soil-moisture studies on the experimental plots are being continued. The labor involved in collecting soil samples for moisture determination has been reduced about 50 percent. This is accomplished by using a regular soil tube jack for pulling the soil auger used in sampling."

Irrigation Studies - R. A. Work and W. T. Frost, Medford, Oregon.-"Mr. Frost's time has mostly been spent in the field maintaining snow courses and measuring equipment, stocking shelter cabins, and re-enlisting observers for the coming winter season. Mr. Frost met with Fred Strauss, representing State Engineer of California, on August 21, and completed arrangements for the transfer from SCS supervision to State of California of several California snow courses which have been supervised by SCS for 12 years. Three cabins were also transferred. This administrative change seemed in general interest of the snow survey program as SCS has not the funds with which to continue these surveys.

"Mr. Beaumont continued his studies of snow cover-runoff relationships for Oregon streams.

"R. A. Work conferred in Logan with Chief Clyde relative to certain snow survey agreements and in various places with several cooperators relative to 1950-51 surveys and particularly with officials of USBR, USFS, and USGA relative to expansion of the snow survey network above Hungry Horse Dam. Several days were spent in Montana field work with A. R. Codd.

"Work consulted in Portland with Mr. Herbert Peet, Regional Forester Andrews and with others relative to certain CBIAC Task Force activities and prepared a summary of Columbia Basin snow course schedules for a Hydrology Sub-committee Task Force of CBIAC.

"The research paper on peak flow forecasting being jointly prepared with USFS is now in the hands of Dr. Wilm for Forest Service review."

Irrigation Studies - Dean W. Bloodgood, Austin, Texas.-"During the month we multilithed 400 copies of Progress Report No. 11 of Silt Load of Texas Streams (1948-1949). The report contains 58 pages. It is available for distribution upon request. During the latter part of August approximately 175 mimeographed letters were mailed to a selected list of individuals and agencies interested in silt problems of Texas streams."

11/22/50